



Regional Concept of Transportation Operations

FINAL REPORT

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Table of Contents

SECTION 1: INTRODUCTION	1
SECTION 2: REGIONAL OVERVIEW	3
REGIONAL TRANSPORTATION SYSTEM	4
CURRENT TRANSPORTATION OPERATIONS IN THE MAG REGION	4
A FRAMEWORK FOR REGIONAL OPERATIONS PLANNING	5
NEED FOR A REGIONAL CONCEPT OF TRANSPORTATION OPERATIONS	6
CHALLENGES FACING A REGIONAL APPROACH TO TRANSPORTATION OPERATIONS	7
SECTION 3: VISION AND MISSION	8
SECTION 4: ACHIEVING THE VISION	10
WHERE DO WE NEED/WANT TO BE IN 3 YEARS AND 5 YEARS?	10
GOALS	11
SECTION 5: PRIORITY REGIONAL FUNCTIONS AND INITIATIVES	13
INITIATIVES	14
PERFORMANCE MEASURES	16
SECTION 6: INSTITUTIONAL NEEDS AND REQUIRED RESOURCES	18
NEEDED POLICIES, PRACTICES AND PROCEDURES	18
OPERATIONS GUIDELINES	21
SECTION 7: KEEPING THE MOMENTUM	22
MEMORANDUM OF UNDERSTANDING	23
RESPONSIBILITIES OF INDIVIDUAL AGENCIES	23
PROGRESS REPORTING	27
WHAT'S NEXT?	27
CONTINUED, RELIABLE FINANCIAL SUPPORT OF OPERATIONS	27
CAPITALIZE ON EXISTING PROGRAMS AND PRACTICES	27
DEVELOP A WORK-PLAN FOR ACHIEVING 3-YEAR AND 5-YEAR GOALS	28
IDENTIFY IMPROVEMENTS FOR INCLUSION IN THE MAG TIP	28
DEMONSTRATE THE BENEFITS OF ITS TO THE REGION THROUGH SMALL, FEASIBLE DEPLOYMENTS	28

APPENDIX



Section

1



Introduction

The Phoenix metropolitan area is leading the nation in developing a plan for coordinated transportation operations – that is, mapping out specific strategies of how transportation agencies, public safety, emergency services, transit and others can work better together, to get the most benefit out of the region’s existing systems and transportation resources.

The metro area is comprised of several cities, each with its own transportation system, operational procedures, and operational priorities. On a regional level, the Arizona Department of Transportation’s (ADOT) freeway network provides vital links for travelers to all portions of the metro area. For travelers, a morning or afternoon commute could easily traverse several of these jurisdictions.

With the shift from deployment and implementation toward a stronger focus on operating current systems to achieve the greatest local and regional benefits, the Maricopa Association of Governments (MAG) Intelligent Transportation Systems (ITS) Committee saw a need for a more collaborative approach to regional transportation operations. In August 2002, the MAG ITS Committee spearheaded the development of a Regional Concept of Transportation Operations (RCTO), with strong input and support from agencies throughout the Region.

Several perspectives were brought together, including city, county, regional, state and federal, as well as transit and emergency services agencies, to shape the vision and mission of what coordinated transportation operations would mean for the MAG Region.

Essential to the process of mapping out where the Region should be with regard to regional operations was to identify the current status of agency operations, existing policies and documented practices, and particularly those that enable cooperative

“Operations planning is planning for actually operating the transportation system. Operations are ongoing; every day operations begin anew. Planning deals with the strategic shaping of the transportation system...the product of operations is successful performance for another day’s traffic.”

**Joseph M. Sussman,
Transportation
Operations: An
Organization and
Institutional
Perspective,
December, 2001**



An important part of the approach to the Regional Concept of Transportation Operations was that it not prescribe or impose new operating or system management procedures on local agencies for their jurisdictions, but rather identify those functions and services that would provide greater benefit if approached at the regional level.

operations with one or more agencies. There are many functions being carried out by local traffic, transit, emergency services and other agencies as a matter of day-to-day operations. For the RCTO, it was important to identify what ‘functions’ local agencies had to consider with the region in mind – such as coordinating traffic signals on cross-jurisdictional corridors – and what ‘functions’ were indeed regional in nature, such as freeway operations or travel information. An important part of the approach to RCTO was that it not prescribe or impose new operating or system management procedures on local agencies for their jurisdictions, but rather identify those ‘functions’ and services that would provide greater benefit if approached at the regional level.

‘Functions’ are grouped into one of 11 initiative areas, and each initiative is being spearheaded by a local ‘champion’ who will have responsibility for coordinating the efforts and activities required to carry out the functions, establishing interim milestones, and updating the MAG ITS Committee on the status, successes and any issues encountered.

Near-term goals for regional operations were established by stakeholders. While most transportation or system plans look to the 10 or 20 year horizon, the RCTO identified goals for the 3 and 5 year timeframes. The majority of the infrastructure and institutional frameworks are largely in place in the MAG Region to support a higher level of cooperation and coordination for transportation operations – in most cases, what’s needed to achieve the vision and goals are the enabling agreements, policies and standard practices.

Measuring the Region’s progress in achieving the goals that were established is critical to the near-term success of the recommended strategies and initiatives. Performance measures were identified for each of the 3 and 5 year goals, and MAG will be overseeing the performance measuring and assessment processes.

The Federal Highway Administration has placed a strong focus on coordinated transportation operations. Within the next few years, there will likely be a federal requirement for regions to have plans in place that go beyond individual system operations and emphasize how various local systems, including traffic management, incident and emergency services, travel information, transit operations, and others, can work together at a level that provides benefits to regional mobility, security and safety. With the Regional Concept of Transportation Operations, MAG members are on the leading edge of planning for regional transportation operations, and this region will likely serve as a benchmark for other areas of the country that will soon be embarking on their Concepts of Operations.



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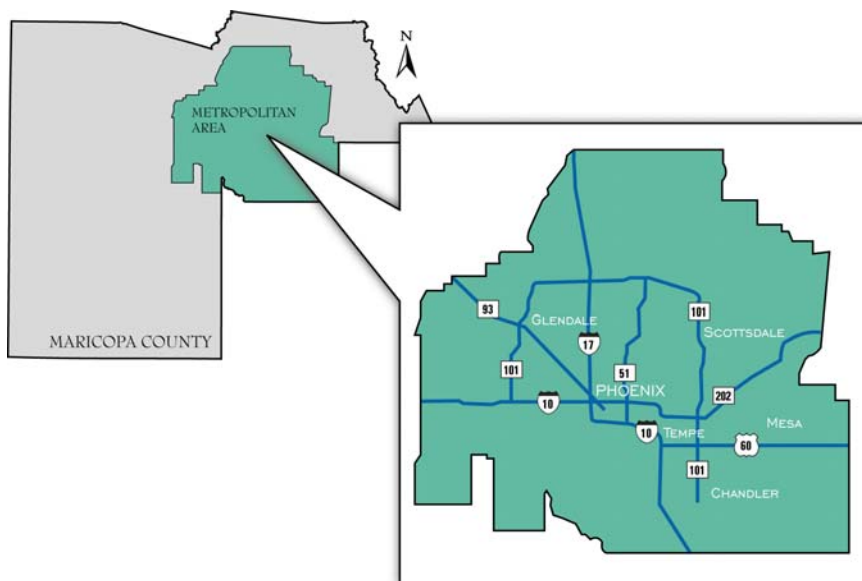
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Regional Overview

With more than 3 million people in approximately 1,500 square miles of the urbanized Phoenix metro area, local, regional and state agencies are working diligently to make sure that transportation facilities throughout the Region can keep up with the ever-increasing demands. In the last 10 years, the population of the MAG Region has grown by over one million. This rapid and expansive increase, particularly in the suburban portions of the metro area means more cars driving more miles on an at-capacity transportation system.

Phoenix, the sixth largest city in the United States, is the core of the urban area which also includes the cities of Chandler, Gilbert, Glendale, Mesa, Peoria, Scottsdale, and Tempe – each are significant sized cities on their own. Managing and operating these individual transportation systems at the local level becomes challenging for agencies with limited resources. This challenge becomes more paramount when transportation management and operations needs to be approached at a more regional level.



CITY	Current Population	2020 Projection
1. Phoenix	1.3 million	1.7 million
2. Mesa	426,000	593,333
3. Glendale	230,000	305,000
4. Scottsdale	215,000	306,000
5. Chandler	202,000	258,000
6. Tempe	159,000	183,000
7. Gilbert	135,000	244,000
8. Peoria	123,000	183,000
9. Avondale	48,000	84,000
10. Surprise	44,000	60,000

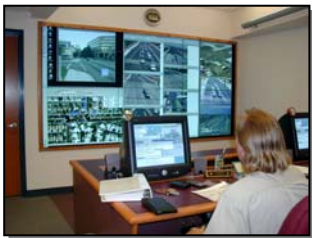


Regional Transportation System



ADOT'S FREEWAY MANAGEMENT SYSTEM

- Launched in 1995
- 55 miles currently instrumented
- 30 miles of FMS under construction or near construction



CHANDLER TMC

Chandler's TMC came on-line in July 2002. The city's traffic management system has over 140 traffic signals and CCTV monitoring at 40 intersections. Six new cameras and one variable message sign are being installed as part of AZTech™.

The Arizona Department of Transportation (ADOT) operates and maintains the region's freeway network, which by 2007 will include over 146 miles of urban freeways. Freeway construction throughout the region has been accelerated in order to meet the demands of the region's growing population. Widening of existing freeways, including U.S. 60 in the East Valley and S.R. 51 in central Phoenix is helping to increase capacity on these vital corridors.

Travelers in the Valley are very dependent on the region's arterial roadway system, and there are several major arterials that cross multiple jurisdictions in the metro area. These cross-jurisdictional arterial corridors can include two, three or four different traffic signal systems operated by different cities in the region, as well as two or more interchanges with freeways. Local agencies recognize that improved traffic signal operations are a significant factor in overall mobility throughout the region. Each city in the MAG Region and Maricopa County operates independent traffic signal systems, which pose several challenges to the vision of a 'seamless' arterial network. Traffic Signal Groups in the East Valley and West Valley, and the Valley Area Traffic Engineers Committee provide forums for local traffic operations personnel and managers to discuss traffic signal operations and management issues in a multi-jurisdictional context.

Transit services are provided throughout the region by Valley Metro. Fixed-route and paratransit services are being expanded to include Bus Rapid Transit, and a Light Rail Transit system is scheduled to come on-line in late 2006. Transit signal priority has not yet been implemented in the MAG Region, although with express services such as Bus Rapid Transit and the upcoming Light Rail Transit, enhancing coordination between traffic and transit operations will likely become a stronger focus in the region.

Agencies within the MAG Region have been actively implementing Intelligent Transportation Systems (ITS) technologies to support their traffic and incident management, travel information, day-to-day operations and maintenance of their systems. Traffic Management Centers are becoming an integral part of Street or Transportation Departments in cities in the MAG Region. The ADOT Traffic Operations Center serves as the center of operations for the state highway system. The Maricopa County TMC serves as the center of operations for roads in unincorporated areas.

Current Transportation Operations in the MAG Region

ADOT, cities, Maricopa County, transit, public safety, emergency services, and others in the region are responsible for operating and maintaining their own 'pieces' of the regional transportation system.

- ADOT operates and manages the regional freeway network, including traffic signals at most freeway interchanges;



- The Arizona Department of Public Safety and the Arizona Department of Transportation responds to and manages incidents on freeways and highways;
- Cities are responsible for their own traffic signal systems, including many signals at freeway interchanges, traffic and incident management on arterials within their boundaries;
- There are freeways in the east and northeast portions of the Valley that are located on Tribal lands, which requires consultation with the respective Tribal governments;
- Similarly, local police, fire and emergency services also respond to traffic incidents on roadways within their jurisdiction, although there is a high degree of cooperation among emergency responders as part of current mutual aid agreements;
- Maricopa County operates and manages those arterials in unincorporated areas of the Region, including traffic signals; and
- Valley Metro is the ‘umbrella’ under which city and private transit companies provide fixed route, express, vanpool and dial-a-ride services throughout the Region.

There are few formal policies in place in the MAG Region that support collaborative transportation operations. Most agencies in the Valley have written policies or procedures that are specific to their own system and operational needs. Most agencies also have undocumented practices that are routinely used, although not considered formal policies or procedures.

While there are few regional policies with regard to transportation operations, the exception is emergency services. Several formal agreements and organizations are in place to coordinate emergency response and management in the Region. Fire departments valley-wide operate using the Phoenix Regional Standard Operating Procedures, which are detailed processes and protocols that standardize communication paths and responses for responding agencies across multiple jurisdictions. Fire departments have mutual aid agreements that document procedures for responding to emergency call-outs in each others’ jurisdictions.

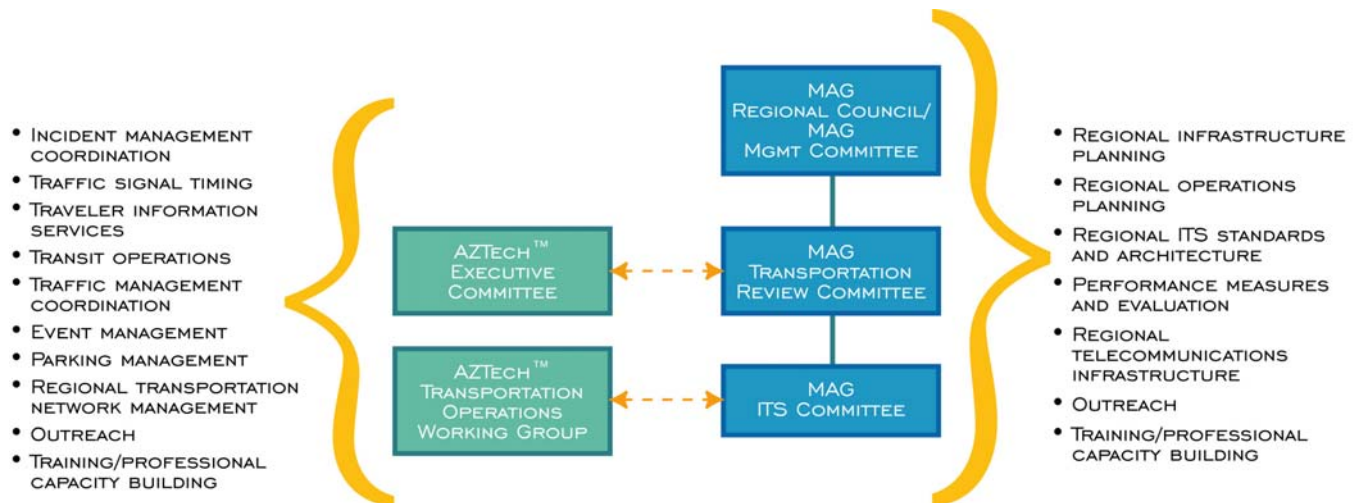
A Framework for Regional Operations Planning

Coordinating these independent systems takes a concerted effort among state, regional, and local entities within the MAG Region. At present, there is no single entity in the region that is responsible for operations on the regional level. There is, however, an existing institutional framework to support planning for and coordinating regional transportation operations and management functions:

- **The MAG ITS Committee**, which plans all regional ITS infrastructure and recommends regional investments in ITS. MAG brings a strong multi-modal perspective to the operations planning process.



- **AZTech™**, an informal coalition of federal, state, local and private entities. Within the AZTech™ framework are working groups focused on traffic operations, incident management, telecommunications, travel information and other facets of the regional transportation system.
- **East and West Valley Traffic Signal Timing Groups and the Valley Area Traffic Engineering Committee (VATEC)** are other forums where agency transportation management and operations staff can meet to discuss traffic signal timing, operations and other management issues.



Need for a Regional Concept of Transportation Operations

The Regional Concept of Transportation Operations, or RCTO, was an outcome of the update to the Region's ITS Strategic Plan Update completed by MAG in 2001.

Considering the level of ITS deployment in the Region, the growing need for adjacent jurisdictions to work together to address common functions and needs, and looking at how the transportation system needed to perform on a regional level, the MAG ITS Committee saw a need for a more collaborative approach to regional operations. This approach needed to go beyond individual system operations, and emphasize how the various local systems can work together at a level that provides benefits to regional mobility, security and safety.

A key element of the RCTO was that it needed to focus on those operational components that were indeed regional in nature or would affect adjacent or multiple jurisdictions. Elements such as freeways, transit, travel information, communications among the various centers, and standard practices for timing traffic signals all require that one or more agencies be involved in operating those elements, and they need to be carried out with the perspective that they are vital elements of the 'regional' transportation system.

The objective of the RCTO was to identify specific strategies of how transportation agencies, incident management, transit and others can work better together to get the most benefit out of the region's transportation system.



Another important objective was to identify what ‘local’ functions agencies are currently doing that should be considered from a bigger picture perspective. One example would be how cities can work together to effectively operate cross-town corridors with multiple signal systems so that the trip from one end of town to the other is seamless to the driver, regardless of how many different borders he or she crosses. Another example is shared resources, particularly for maintenance. Is there a benefit to having an agency with adequate numbers of trained, experienced technical staff serve as a regional resource for other cities with similar equipment?

Challenges Facing a Regional Approach to Transportation Operations

Recognizing that alternative solutions to building out an at-capacity transportation system are needed to ensure that the system can be effectively operated to meet the regional needs, the Regional Concept of Transportation Operations set out to provide a roadmap for addressing priority regional functions, needs and services.

Several perspectives were brought together, including city, county, regional, state and federal, to shape the vision and mission of what coordinated transportation operations would mean for the MAG Region. To effectively plan for coordinated operations, several questions and issues need a consensus-based approach:

- Where are we today with operations? At the local levels and at the regional level?
- Where do we want to be in 3 years? In 5 years?
- What are the highest priority functions that the Region needs to look at to provide a safer, more reliable, and seamless transportation system?
- Is it a matter of deploying new projects, or can coordinated operations be achieved through more cooperative approaches and formal agreements?
- Does the institutional framework support the vision for coordinated regional transportation operations, or does there need to be a new regional entity?
- Who or what agency is responsible for leading initiatives that put the processes and strategies in place for regional operations?
- How will progress toward achieving the Regional goals be measured?



Section**3**

Vision and Mission

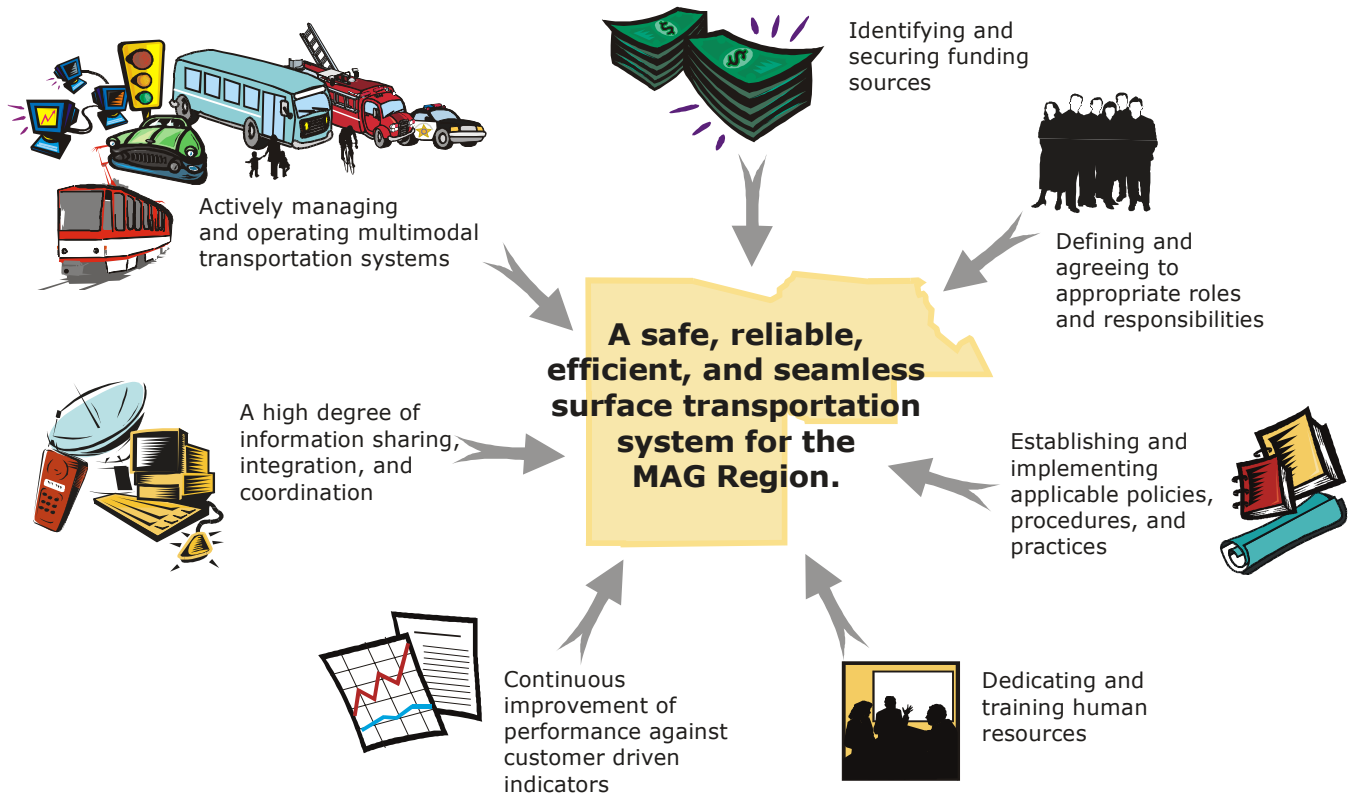
A safe, reliable, efficient and seamless surface transportation system for the MAG Region

To provide a safe, reliable, efficient and seamless surface transportation system for the MAG Region, agencies have identified a need for stronger coordination and collaboration for regional operations. Six key principles provide the foundation for this new approach to regional operations, and guided the development of the Regional Concept of Transportation Operations.

To accomplish this vision, coordination needs to happen at all levels to:

- Share information, coordinate resources, and link systems among state, local, transit, and emergency services agencies in the Region;
- Manage and operate our systems to their optimum performance, efficiency and safety;
- Identify and secure the funding for operations, and mainstream operations requirements into annual and program budgets;
- Agree on roles and responsibilities for local and regional agencies, with an emphasis on those roles and responsibilities needed to carry out regional functions;
- Develop the policies that are needed at the regional level to be sure that agencies can make maximum use of available resources, and are able to share resources where it benefits and enhances the safety and efficiency of the Regional transportation system; and
- Actively measure the performance of the strategies and map to the three year and five year goals that have been established.





Several missions contribute to the vision for the MAG Region.



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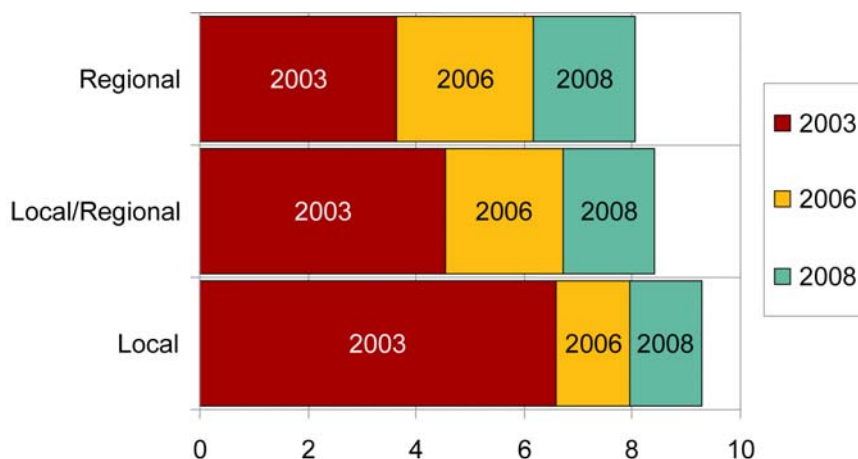
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Achieving the Vision

Where do We Need and Want to Be in Three Years and Five Years?

At a Stakeholder Group Meeting on March 5, 2003, an opinion poll was taken as to how the region is performing transportation operations today, where they would like to be in three years, and where they would like to be in five years. The stakeholders rated their performance on a scale of one to ten, with ten meaning that they perform extremely well. The stakeholders perceived that agencies in the region currently perform on a local level fairly well, while the stakeholders do not currently perform well at a regional level. The stakeholders desire to see dramatic improvement in five years, especially in the area of regional performance. The results are shown in the graphic below.



Goals

Operational goals are prepared as a means of setting a target for the region to aim for over the next three to five year time period. Having these goals in front of all agencies provides some focused direction, leading to achieving the stated vision and mission for the region. The proposed three-year and five-year goals for the MAG Region are summarized in the following table.

OPERATIONAL CATEGORIES	THREE-YEAR GOAL	FIVE-YEAR GOAL
FREEWAY MOBILITY	<ul style="list-style-type: none"> ▪ Limit the percent increase in average travel time to less than the percent increase in traffic volume. 	<ul style="list-style-type: none"> ▪ Same as three-year goal.
ARTERIAL MOBILITY	<ul style="list-style-type: none"> ▪ Limit the percent increase in average arterial travel time to less than the percent increase in traffic volume. ▪ Optimize traffic signal coordination within and between cities on major arterials, or where appropriate. 	<ul style="list-style-type: none"> ▪ Continue to limit the percent increase in average arterial travel time to less than the percent increase in traffic volume. ▪ Update the traffic signal coordination within cities and between cities every two years or when traffic volumes through the intersection change by more than five percent.
FREEWAY INCIDENT MANAGEMENT	<ul style="list-style-type: none"> ▪ Reduce incident duration by 10 percent. 	<ul style="list-style-type: none"> ▪ Reduce incident duration by 20 percent.
FREEWAY-ARTERIAL INTERFACE	<ul style="list-style-type: none"> ▪ Establish integrated freeway-arterial corridor operations on one corridor. 	<ul style="list-style-type: none"> ▪ Establish integrated freeway-arterial corridor operations on three corridors.
ARTERIAL INCIDENT MANAGEMENT	<ul style="list-style-type: none"> ▪ Conduct a feasibility and planning study for a multi-jurisdictional arterial incident management program. 	<ul style="list-style-type: none"> ▪ Implement a multi-jurisdictional arterial incident management program (based on outcomes of feasibility study).
ARTERIAL OPERATIONS	<ul style="list-style-type: none"> ▪ Establish a regional standard for implementation of emergency vehicle signal preemption (EVSP). 	<ul style="list-style-type: none"> ▪ Ensure adoption of the EVSP standard by each of the MAG member agencies, and implement the standard on 100 percent of the traffic signals with EVSP.
TRANSIT MOBILITY	<ul style="list-style-type: none"> ▪ Deploy a transit signal priority pilot project. 	<ul style="list-style-type: none"> ▪ Where beneficial, deploy transit signal priority to BRT routes.
COMPUTER SYSTEM RELIABILITY	<ul style="list-style-type: none"> ▪ Operate the system with up time of 95 percent – no more than 450 hours down time per year. Allows for approximately eight hours of system maintenance per week. Maintenance is preferably conducted in off-peak periods. ▪ Minimize system down time to an average of one hour per system failure. 	<ul style="list-style-type: none"> ▪ The five-year goals for system reliability are the same as the three-year goals.



OPERATIONAL CATEGORIES	THREE-YEAR GOAL	FIVE-YEAR GOAL
MULTI-AGENCY COORDINATION	<ul style="list-style-type: none"> ▪ Establish center-to-center communications between 15 agencies in the region. These agencies should include traffic and transportation, enforcement, emergency management, and transit. ▪ Facilitate incident and emergency response and travel information sharing between 15 agencies. 	<ul style="list-style-type: none"> ▪ Establish center-to-center communications between 20 agencies in the region. These agencies should include traffic and transportation, enforcement, emergency services, and transit. ▪ Facilitate incident and emergency response and travel information sharing between 20 agencies.
TRAVEL INFORMATION PROVISION	<ul style="list-style-type: none"> ▪ Increase travel information usage (web, 511, television, radio, etc.) by 100 percent, and achieve a 75 percent customer satisfaction rating. On a scale of 1 to 10, a score of 7 or higher is desired. ▪ Expand Phase 1 of the ADOT / MCDOT / City of Scottsdale web-based HCRS pilot project for local closure and restriction information to include 5 additional MAG member agencies (Phase 2). ▪ Incorporate transit status information from AVL data from buses into travel information services. ▪ Develop web-based arterial maps for 100% of instrumented smart corridors. 	<ul style="list-style-type: none"> ▪ Increase travel information usage (web, 511, television, radio, etc.) by 200 percent, and achieve a 75 percent customer satisfaction rating. On a scale of 1 to 10, a score of 7 or higher is desired. ▪ Evaluate performance capabilities of Phase 2 web based HCRS pilot project for local closure and restriction information and expand to include additional MAG member agencies. ▪ Obtain travel time information on 50% of instrumented arterial roadways and post this information to Web, 511, and variable message signs.



TRAVELER INFORMATION

ADOT currently provides freeway traffic and incident information for the metro area via the Web at www.az511.com.



Section

5



Priority Regional Functions and Initiatives

The purpose of the Regional Concept of Transportation Operations is to foster a higher level of integration and coordination among agencies responsible for transportation operations in the MAG Region. Agencies typically take responsibility for operating and maintaining the transportation system within their local jurisdiction. In recent years, some local agencies have begun to work with adjacent agencies on matters such as timing traffic signals on arterials that serve both agencies. This type of cooperation needs to continue to expand to meet the regional needs to provide a seamless transportation system.

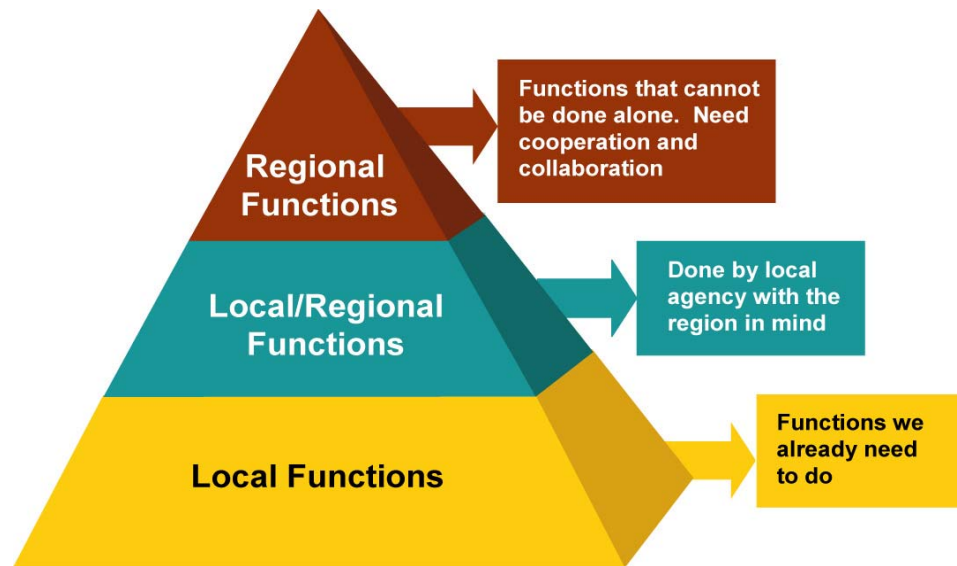
At a MAG Town Hall meeting in early 2003, the number 1 action item, as voted by participants, was synchronized traffic signals.

In developing the Regional Concept of Transportation Operations, it is useful to consider operations functions in three categories: **local functions, local/regional functions, and regional functions.**

1. **Local functions** are those that are the responsibility of an individual agency. These functions can be viewed as those that an agency would be doing anyway even if they had no neighboring cities. These functions provide the foundation for all of the region's operations.
2. **Local/regional functions** are those that can be carried out by the local agency without interagency collaboration but would benefit the local agency and the region if done with a regional perspective. These are functions that are carried out by the local agency that provide regional benefits.
3. **Regional Functions** are those functions that are performed for the regional and local benefit and cannot be performed without regional cooperation and collaboration between agencies.



The graphic below illustrates the relationship between these three categories of functions.



Initiatives

Eleven **initiatives** are recommended as a framework of actions for the region to follow in pursuit of the stated vision of providing a safe, reliable, efficient and seamless surface transportation system. Through these initiatives, the goals established for the ten categories of regional operations can be achieved. Associated with each initiative are the **functions**, or action steps, to be carried out in executing the initiative. These functions are at the core of implementing the Regional Concept of Transportation Operations recommendations.

INITIATIVES		FUNCTIONS
REGIONAL TRAFFIC SIGNAL OPTIMIZATION PROGRAM	Improved traffic signal timing within cities and across jurisdictional boundaries will result from better regional traffic engineering collaboration.	<ul style="list-style-type: none"> Optimize agency traffic signal system operations. Optimize traffic signal operations of cross-border traffic signals and regional arterials. Develop regional pre-set traffic signal timing structure and criteria for traffic signal timing plan changes during incidents.
ARTERIAL AND FREEWAY INCIDENT MANAGEMENT	Improved incident management can be achieved with better collaboration of the fire and public safety personnel with the transportation departments.	<p>Freeways</p> <ul style="list-style-type: none"> Improve agency-specific incident management practices and guidelines to reduce incident clearance times. Schedule incident debriefing sessions after large incidents with representatives of public safety, fire departments, and applicable local transportation agencies.



INITIATIVES		FUNCTIONS
ARTERIAL AND FREEWAY INCIDENT MANAGEMENT (CONTINUED)		<ul style="list-style-type: none"> ▪ Improve the pre-qualified list of towing and recovery vehicles. ▪ Facilitate agreements between agencies to extract computer-aided-dispatch (CAD) information for travel information services and ADOT TOC. ▪ Facilitate improvement of practices for on-scene coordination and communication. ▪ Facilitate improvement of practices for placement of emergency vehicles at incident scenes. <p style="text-align: center;"><u>Arterials</u></p> <ul style="list-style-type: none"> ▪ Implement and maintain a multi-jurisdictional Arterial Incident Management Program, based on results of feasibility study and pilot project. ▪ Facilitate agreements between agencies to extract CAD information for local traffic management centers.
SHARED MAINTENANCE RESOURCES	Improved system performance and significant cost savings to the region will result from sharing resources (staff and equipment).	<ul style="list-style-type: none"> ▪ Improve preventive maintenance and prompt repair of locally owned ITS field devices and central systems. ▪ Improve preventive maintenance and prompt repair of regionally significant ITS field devices and central systems. ▪ Maintain regional communications infrastructure. ▪ Develop cost sharing agreements between agencies.
FREEWAY- ARTERIAL OPERATIONS	An emphasis and focus on improving the operations of the arterials and freeways at traffic interchanges can be beneficial in optimizing the operation of the freeways and arterials.	<ul style="list-style-type: none"> ▪ Plan, deploy, operate and maintain a freeway-arterial corridor operations pilot project.
EMERGENCY VEHICLE SIGNAL PREEMPTION	Preemption on a regional basis will be more effective and safer with a common set of standards for its implementation.	<ul style="list-style-type: none"> ▪ Develop regionally accepted standard for emergency vehicle signal preemption.
TRANSIT SIGNAL PRIORITY	The implementation of transit signal priority on a corridor will demonstrate the effectiveness of this concept for regional transit mobility.	<ul style="list-style-type: none"> ▪ Plan, deploy, operate, maintain and evaluate a Transit Signal Priority pilot project.





**SCOTTSDALE
TMC**

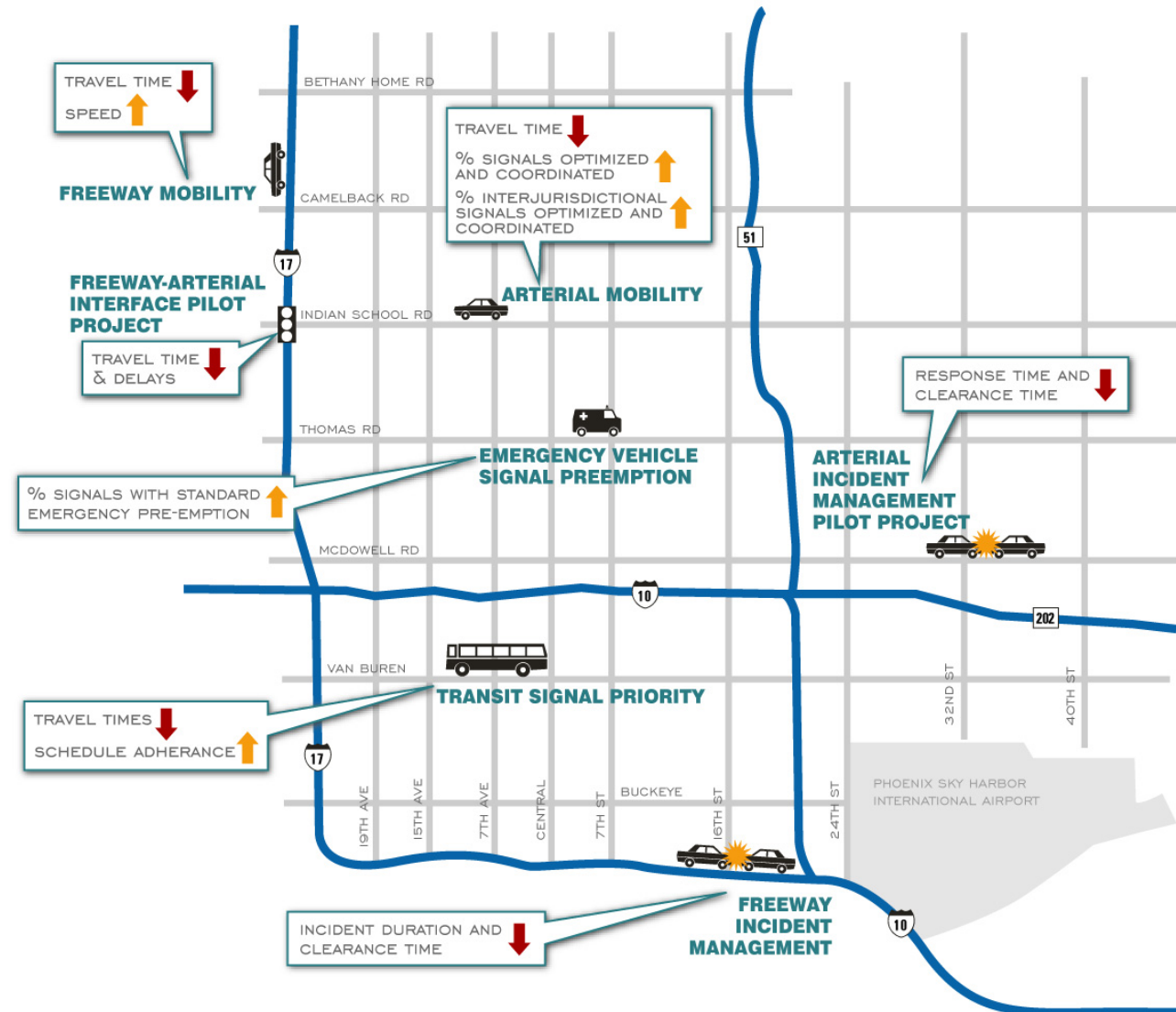
INITIATIVES		FUNCTIONS
CENTER-TO-CENTER COMMUNICATIONS	Better communications between agencies.	<ul style="list-style-type: none"> ▪ Establish center-to-center communications between agencies.
ARCHIVED DATA	Collecting and storing data from implemented transportation systems will be an excellent resource for the region in planning operational enhancements.	<ul style="list-style-type: none"> ▪ Develop and implement a regional data archiving system.
LOCAL TMC AND ADOT TMC OPERATORS	The effectiveness of TMC operators will be improved with better coordination and communication between themselves.	<ul style="list-style-type: none"> ▪ Develop and maintain a comprehensive personnel and logistics resource list. ▪ Develop practices for after-hours monitoring of local TMC systems and devices. ▪ Improve inter-agency communication between TMCs during incidents.
TRAVEL INFORMATION	Improved travel information in the MAG region will benefit the regional mobility.	<ul style="list-style-type: none"> ▪ Make available work zone and incident information to HCRS and/or 511. ▪ Integrate transit information with travel information services (e.g., provide AVL data to 511). ▪ Develop practices for collecting information from arterial detectors. ▪ Post travel information/messages on freeway and arterial VMS. ▪ Market travel information services.
PERFORMANCE MEASUREMENT	The effectiveness of all the initiatives can be measured through a performance measurement program.	<ul style="list-style-type: none"> ▪ Develop performance measurement program.

Performance Measures

Performance measures are identified to enable the region to quantify how well the operations initiatives are working in meeting the Regional Concept of Transportation Operations goals. Some performance measures are expected to increase and others are expected to decrease, as indicated in the figure on the following page. Performance measures are tailored to arterials and freeways recognizing that they have different operating characteristics.



Performance Measures



SYSTEM WIDE MEASURES

COMPUTER SYSTEM RELIABILITY	↑ UPTIME	TRAVEL INFORMATION	↑ NUMBER OF USERS	↑ % OF BUSES EQUIPPED WITH AVL
	↓ TIME TO RESUME SERVICE		↑ # OF AGENCIES PARTICIPANTS IN WEB-BASED HCERS	↑ % OF ARTERIALS WITH TRAVEL TIME INFORMATION
MULTI-AGENCY COORDINATION	↑ NUMBER OF CENTER TO CENTER COMMUNICATION LINKS		↑ % OF SMART CORRIDORS WITH SPEED MAPS	↑ CUSTOMER SATISFACTION



Section

6



Institutional Needs and Required Resources

Needed Policies, Practices and Procedures

To achieve the stated vision and goals for improved regional transportation operations, there are institutional matters to be addressed and resources are required to execute the initiatives that have been identified for the MAG Region.

The operation of the transportation system is guided by agency policies, procedures and practices. **Policies** are considered written goals and intentions of the agency for a particular aspect of transportation operations. Policies could be in the form of state laws, codes, statutes, city council resolutions or documents produced by the department or agency. **Procedures** are written, defined steps used by agencies to implement an aspect of transportation operations. **Practices** are those activities that are routinely undertaken, but for which there is not a formal written document that directly describes the activities.

Stakeholders identified a need for additional policies, procedures, and practices to help achieve a regional approach to transportation operations. A summary of the needed procedures, practices, and policies is presented on the following page grouped by operational category. The procedures and practices are grouped together to reflect the stakeholders' desire for flexibility when addressing their operational activities.



OPERATIONAL CATEGORY	NEEDED PROCEDURES OR PRACTICES	NEEDED POLICIES
FREEWAY MOBILITY	<ul style="list-style-type: none"> ▪ Traffic Responsive Ramp Metering ▪ Notifying Agencies and Organizations of Freeway Incidents ▪ Removing Disabled Transit Vehicles off Freeways 	<ul style="list-style-type: none"> ▪ Improve Freeway Incident Clearance Times
ARTERIAL MOBILITY	<ul style="list-style-type: none"> ▪ Optimizing Traffic Signals within a City on 100% of the Smart Corridors and Assessing the Coordination Every 2 Years ▪ Optimizing and Coordinating, if beneficial, Traffic Signals between Cities on 100% of the Smart Corridors ▪ Grouping of Signals into Control Sections Irrespective of Jurisdiction ▪ Assessing Coordination Every Two Years 	
FREEWAY INCIDENT MANAGEMENT	<ul style="list-style-type: none"> ▪ Altering Traffic Signal Timing Plans during Incidents ▪ Incident On-Scene Coordination and Communications between Public Safety, Emergency Service and Transportation Personnel 	<ul style="list-style-type: none"> ▪ Shared Operations and Use of CCTV Cameras ▪ Extraction of DPS CAD Information, where available, and Importing this Information to ADOT TOC ▪ Shared Operations of State and Local Variable Message Signs ▪ Placement of Response Vehicles at Incident Scenes ▪ Removal of Fatalities from Accident Scenes
FREEWAY-ARTERIAL INTERFACE		<ul style="list-style-type: none"> ▪ Coordinated Freeway-Arterial Corridor Operations ▪ Ramp-Metering Coordination with Traffic Signal Systems



OPERATIONAL CATEGORY	NEEDED PROCEDURES OR PRACTICES	NEEDED POLICIES
ARTERIAL INCIDENT MANAGEMENT	<ul style="list-style-type: none"> ▪ Transit Operators to Notify Transit Control Center of Incidents and Congested Areas ▪ Improving Arterial Incident/Crash Clearance Times 	<ul style="list-style-type: none"> ▪ Multi-jurisdictional Arterial Incident Management Program Pilot Project ▪ Extract Filtered Incident Information, where available, from City Police, Fire, and Sheriff CAD Systems for Local Traffic Management Centers ▪ Altering Signal-Timing Plans during Incidents ▪ Regional Emergency Vehicle Preemption System Implementation
TRANSIT MOBILITY		<ul style="list-style-type: none"> ▪ Implementing and Operating a Transit Signal Priority Pilot Project
SYSTEM RELIABILITY	<ul style="list-style-type: none"> ▪ System Preventive Maintenance ▪ Using a Back-Up Plan for Unscheduled System Down-Time ▪ Notifying Internal and Maintenance Staff Immediately of Failures 	
MULTI-AGENCY COORDINATION	<ul style="list-style-type: none"> ▪ Providing Notification to Agencies and Organizations of Freeway Incidents ▪ Regularly Meeting with Fire, Police, and EMS Staff within Cities, State, and County 	<ul style="list-style-type: none"> ▪ Sharing and Disseminating Data and Video between Agencies, Including Detector Data, Real-Time Signal-Timing, and Video Images ▪ After-hours Traffic Signal Operations Monitoring and Control
TRAVEL INFORMATION PROVISION	<ul style="list-style-type: none"> ▪ The Input of Local Arterial Data, such as Local City Work Zone Information, into Web-based Highway Condition Reporting System (HCRS) ▪ Collect Data from Instrumented Smart Corridors 	<ul style="list-style-type: none"> ▪ Inclusion of Transit AVL Data into 511 ▪ Integrate web-based HCRS with Local Agency Legacy Closure Information Systems ▪ Posting Travel Time Information on Variable Message Signs ▪ Automate Extraction of Incident Information from CAD Systems, where Available



Operations Guidelines

A key outcome of the RCTO effort was the Regional Transportation Operations Guidelines. The Transportation Operations Guidelines is a tool to assist agencies in implementing the Regional Concept of Transportation Operations. The guidelines will contain agreed upon guidance and procedures for agencies involved in jointly operating and maintaining the surface transportation system in the MAG Region. The Guidelines is intended to facilitate coordination of the transportation facilities operations, with the objective of improving conditions for travelers.

Complete sections of the Operations Guidelines have been prepared for two areas: **Corridor Management** and **Operations at the Freeway-Arterial Interface**.

The **Corridor Management** section contains guidelines for operations and management of regional corridors which may include both arterial and freeway facilities. Included are guidelines for CCTV monitoring, detector monitoring, ramp metering, VMS messaging, and detours and diversions.

The **Operations at the Freeway/Arterial Interface** section establishes operational objectives and provides guidelines for operations of traffic signals and ramp meters at freeway interchanges with arterials.

In addition to these two sections, the Operations Guidelines will contain sections relating to:

- **Interjurisdictional Signal Coordination**
- **Incident Management**
- **Information Exchange**
- **Regional Maintenance Practices**

Though these sections were not developed in-full as part of the RCTO, an outline was prepared to guide future development of these chapters. These sections of the Guidelines may be developed in-house by MAG staff, or by a Consultant. The MAG ITS Committee will provide prioritization and guidance for the development of the sections.



Section

7



Keeping the Momentum

*Transportation Operations **can** be improved in the MAG Region.*

The goals established for regional operations can be achieved when those agencies responsible for the day-to-day operations and management of the transportation system work together to solve operational problems, improve system performance, and communicate successfully with one another. Significant progress has been made toward achieving these results through the MAG Regional Concept of Transportation Operations, which brought transportation, public safety, and emergency services professionals together, providing the ‘table’ around which future discussions of transportation operations can take place.

Continued, long-term improvement of transportation operations in the MAG Region is dependent upon the collective efforts of many individuals from agencies throughout the MAG Region. This journey toward improved transportation operations will require these agencies’ continued participation. It is the collective individual efforts of many that will produce the benefits to the regional transportation system as a whole.

It is essential for the region to keep the momentum gained during the development of the Regional Concept of Transportation Operations to help managers, engineers, planners, and other transportation and emergency professionals continue to keep an ‘operations focused mind-set’. To do this, RCTO participants will:

- Sign a Memorandum of Understanding;
- Take on specific responsibilities aimed at improvements to the transportation system at a regional level; and
- Report on their progress.



Memorandum of Understanding

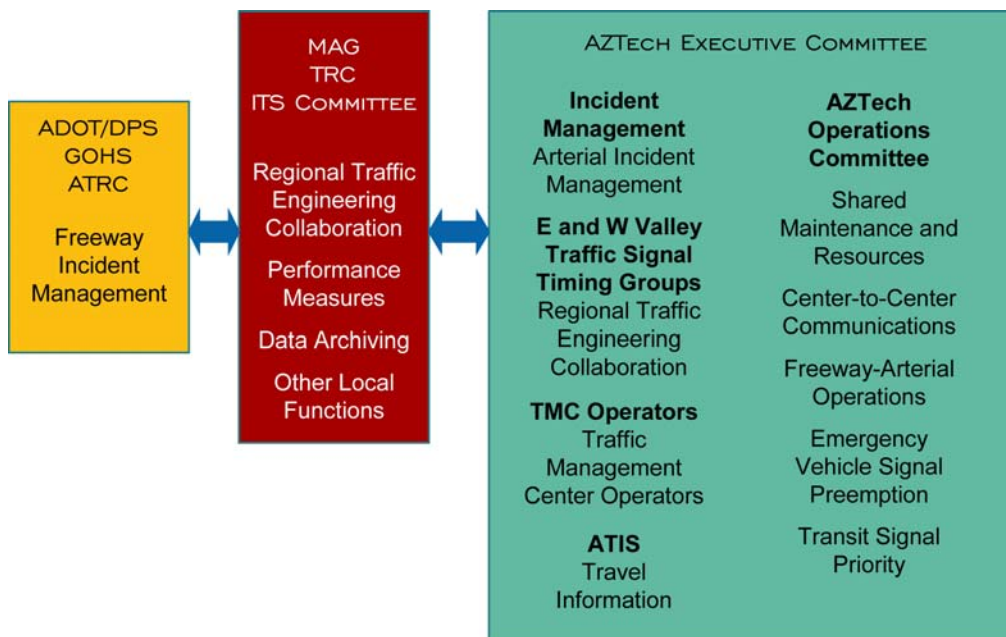
To emphasize their continued support of the activities identified in the Regional Concept of Transportation Operations, participating cities and agencies developed a Memorandum of Understanding (MOU). The purpose of the MOU is to reaffirm the support of each agency and jurisdiction in the Region to improve transportation operations.

Specifically, signatories of the MOU commit, based on available resources, to implement the initiatives identified in the Regional Concept of Transportation Operations. More importantly, they commit to continue to coordinate and cooperate with other MAG member agencies to make the elements of the surface transportation system work better and together. The MOU was approved by the MAG Regional Council on October 22, 2003. The text of the memorandum is found in the Appendix.

Responsibilities of Individual Agencies

At the outset of the Regional Concept of Transportation Operations project, it was very clear that stakeholders did not want to create new institutional layers or regional forums. Rather, existing forums such as **AZTech™** and the **MAG ITS Committee** provided a solid, established foundation for addressing transportation operational issues.

Each of the existing regional forums and committees assumed responsibility for one or more of the initiative areas. Stakeholders assigned specific responsibilities to existing committees and working groups, with a “champion” identified for each of the initiative areas.

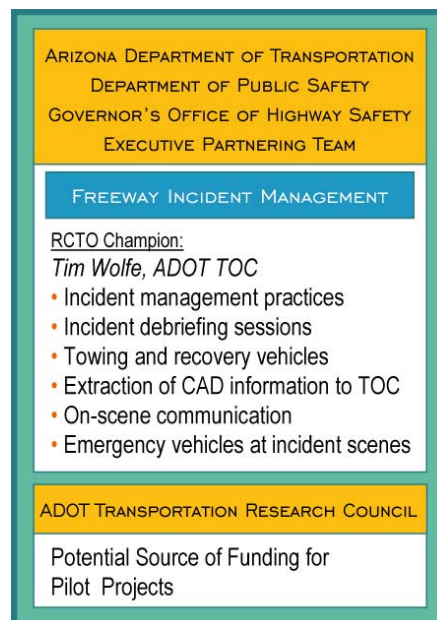


Champions were selected based upon their current involvement in the initiative area, willingness to serve, and their level of expertise. The champions will:

- Provide leadership and act as a catalyst for bringing the appropriate individuals together to resolve technical and institutional issues;
- Elevate pertinent issues to the appropriate regional committee, if necessary;
- Inform and update the MAG ITS Committee of progress being made in the initiative area;
- Coordinate the work planning of relevant projects and activities; and
- Facilitate coordination with other pertinent stakeholders.

State, county, and local agencies from throughout the MAG Region have offered their time, resources, and expertise to improve transportation operations at the regional level. It is through this spirit of cooperation and collaboration that the collective efforts of individual agencies will provide the wide-area benefits to the regional transportation system.

The Arizona Department of Transportation, Arizona Department of Public Safety, and the Governor's Office of Highway Safety have established the **ADOT/DPS/GOHS Executive Partnering Team**. The purpose of the Team, which consists of high-level managers from each of the departments, is to foster coordination between the agencies to improve safety on Arizona's highways. The Team will assume responsibility for improving freeway incident management in the MAG Region.



The Maricopa Association of Governments will be responsible for funding projects to support Regional Traffic Engineering Collaboration. MAG also will lead the performance measurement program which will rely extensively on the regional data archiving system, and input and feedback from the various initiative champions.

The MAG ITS Committee, which meets on a monthly basis, consists of representatives from Federal Highway Administration, Arizona DOT, Arizona Department of Public Safety, Valley Metro, Arizona State University and twelve MAG member agencies. This Committee will provide the forum for discussing other regionally significant issues, such as ramp metering. The MAG ITS Committee will work closely with the MAG Transportation Review Committee to identify projects for inclusion in the MAG TIP.



The **AZTech™ Operations Committee** will assume responsibility for:

- Shared Maintenance and Resources
- Freeway-Arterial Operations
- Emergency Vehicle Signal Preemption



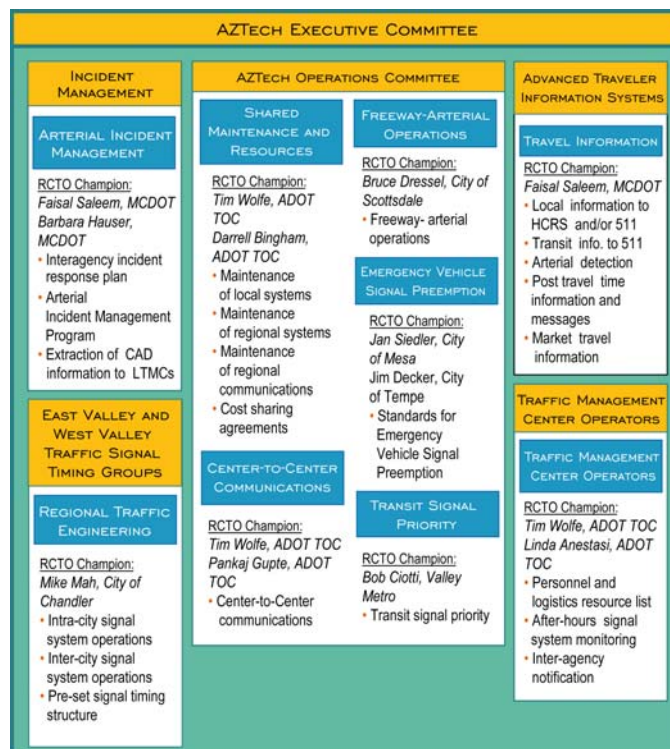
- Transit Signal Priority, and
- Center-to-Center Communications.

The **AZTech™ Incident Management Working Group** will assume responsibility for Arterial Incident Management. A key responsibility of this group will be to work towards expansion of the AZTech™ REACT program to a region-wide service.

The **East Valley and West Valley Traffic Signal Timing Groups** will work to provide technical direction to the projects funded by the MAG ITS Committee. A primary focus of this group will be to improve traffic signal timing between multiple jurisdictions.

The **Advanced Traveler Information Systems Group** will work to improve the availability and accuracy of traveler information to area travelers. Traveler information has been a primary mission of AZTech™ since its inception. This Group also is working with the current public-private partnerships for travel information in the Region.

Finally, the **Traffic Management Center Operators Working Group** will develop and maintain a resource contact list, among other functions. They may also facilitate the pooling of resources to enable after-hours monitoring of signals, cameras, and variable message signs.



Progress Reporting

Maintaining the dialogue on regional transportation operations requires regular assessments on status and progress of initiatives. The MAG ITS Committee, which meets monthly, will devote a portion of every other meeting to discussing operational issues. Initiative champions will be asked to provide updates and any issues encountered with their respective initiative areas to the Committee. In the alternate month, the agenda will focus on items related to ITS infrastructure and capital improvements.

What's Next?

The Regional Concept of Transportation Operations has recognized needs, established goals, identified resources and policies that will be required in order to achieve the goals, and defined responsibilities.

Continued, Reliable Financial Support of Operations

Traditionally, construction and operations aspects of a project are disconnected. This approach does not facilitate the on-going operational needs of ITS. Thus, the region needs to work toward mainstreaming operations and operational requirements of ITS into the traditional transportation planning process. This can be accomplished within the traditional project or capital improvement focused transportation planning process by packaging operational needs, such as annual staffing of a traffic management center, as a project in the Transportation Improvement Program (TIP).

Planning for operational requirements – such as staffing, facilities, and technologies and systems that enable information sharing among agencies – will require some innovative, and perhaps non-traditional approaches, to local and regional improvement programs. Where appropriate, agencies might need to look to some types of alternative solutions, such as shared use of maintenance tools or staff. The region must cooperate, and pool resources, to ensure that a single agency is not burdened by the costs of regional operations so that the costs – and more importantly, the benefits are distributed equally.

Capitalize on Existing Programs and Practices

Throughout the past several years, the region has made significant progress towards improving transportation operations. The AZTech™ organization is often looked to as an example of how a broad spectrum of agencies and jurisdictions, both public and private, can work together with a regional focus. The Region must capitalize on existing forums such as AZTech™ and the established Traffic Signal Timing Groups, and expand on those programs that work well. Through the initiatives and functions that came out of the Regional Concept of Transportation Operations, additional opportunities and needs for collaboration have been identified. The framework is in

Operations means 24/7, it doesn't mean eight hours a day, five days a week. It means performance-based – measuring what you do and measuring how the system operates in response to those actions. And – very importantly – it means using real-time and predictive information to make good decisions and to give the customer the kind of information on which to make his or her own decisions. To do that means using 21st century technology and ITS.
Jeffrey F. Paniati,
FHWA



place; agencies must muster the resources required so that the full benefits of such a program can be realized.

Develop a Work-Plan for Achieving 3-year and 5-year goals

The Regional Concept of Transportation Operations is focused on the very near term, and has identified the goals for transportation operations over the next 3 to 5 years. Now, it is up to the stakeholders to implement the functions and strategies that will improve the surface transportation system. The key to reaching those goals is through incremental, successive, improvements. As part of the work plan for success, short-term (e.g., 6-month) milestones that are established by the initiative champions will lead to larger successes, thus placing the region on a positive path to achieving the three-year and five-year goals, and the ultimate goal of coordinated and improved regional operations.

Identify Improvements for Inclusion in the MAG TIP

The MAG Transportation Improvement Program (TIP) provides an opportunity to include specific projects that will provide measurable, operational benefits. Although the MAG TIP is on a five-year schedule, agencies now need to begin submitting high priority operational projects for consideration. Projects may range from additional communications interconnect to inter-operable radio systems between police, fire, and transportation agencies. Through its on-call contracting processes, MAG will begin funding some of the traffic signal timing and coordination needs on selected priority corridors in the Region.

Demonstrate the Benefits of the Operations of ITS to the Region through Small, Feasible Deployments

The Region needs to demonstrate that small, feasible operational deployments and projects will further goals of participants, and show benefits to the Region. These “early winners” will provide an incentive for participants to remain involved, and to continue to support activities of the Regional Concept of Transportation Operations. Showcasing existing systems and practices, such as the special event traffic management strategies put in place by ADOT, cities, Maricopa County, law enforcement, and others who are involved in special event traffic and incident management, will also demonstrate a “return on investment” to local decision makers and leaders.



For Additional Information:

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Appendix

MAG Regional Concept of Transportation Operations

Memorandum of Understanding



Maricopa Association of Governments

Regional Concept of Transportation Operations

Memorandum of Understanding

1. Introduction

The undersigned agencies have worked together in calendar year 2002 and 2003 to develop a Regional Concept of Transportation Operations. The Regional Concept of Transportation Operations is a regional strategy for achieving improved operations of the surface transportation system through the use of Intelligent Transportation Systems. It describes what activities are to be accomplished over the next 3 to 5 years, how they will be accomplished, and the resources required. The Regional Concept of Transportation Operations delineates responsibilities of city, county, and state agencies that, when enacted, will help to make the elements of the surface transportation system work better and together.

Transportation operations is making the best use of the existing transportation system by providing integrated systems and services that preserve and improve the system's performance in anticipation of or in response to both recurring and non-recurring conditions. Operations includes a range of activities including: routine traffic and transit operations, public safety responses, incident management, inclement weather management, network/facility management, planned construction disruptions, and traveler information. While static traffic control devices, such as roadway signs and striping have a significant impact on the performance of the system, and are an essential part of operations addressed elsewhere, they are not considered part of 'operations' in the context of the MAG Regional Concept of Transportation Operations.

The purpose of this Memorandum of Understanding (MOU) is to affirm the MAG member agencies' commitment to partnership in transportation operations. By signing this MOU, agencies are taking a significant step towards increasing the safety and reliability of travel within the MAG region, creating efficiency in the delivery of transportation services and infrastructure and smoothing transitions between city boundaries. MAG Region transportation system managers believe that when appropriate resources and funding levels are made available for operations and management, significant improvements to the transportation system in the MAG Region can be realized. These actions will result in a safer and more effective environment for first responders and transportation operations staff, and will greatly improve the quality of life in the MAG Region.



There is a growing national focus on regional operations cooperation and collaboration. The upcoming federal transportation funding reauthorization bill, entitled Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003 (SAFETEA), indicates that regional transportation operations collaboration and coordination will likely be added to the list of eligible activities under the Surface Transportation Program, which potentially opens up a new funding source for transportation operations. In addition, development of a regional concept of operations is likely to be necessary for a region to qualify for such funding. The MAG region is well ahead of other U.S. metropolitan areas in development of a regional concept of operations.

This MOU is not a legally binding contract, and does not represent an authorization for funding.

2. Mission and Vision of the Regional Concept of Transportation Operations

Vision A safe, reliable, efficient and seamless surface transportation system for the MAG Region.

Mission This will be achieved through:

- Identifying and securing funding sources
- Actively managing and operating multimodal transportation systems
- A high degree of information sharing, integration and coordination
- Defining and agreeing to appropriate roles and responsibilities
- Establishing and implementing applicable policies, procedures, and practices
- Dedicating and training human resources
- Continuous improvement of performance against customer driven indicators

3. Responsibilities of the Undersigned

The undersigned agree to engage in the roles and responsibilities identified in the Regional Concept of Transportation Operations. These roles and responsibilities are identified under the following categories:

- Arterial Mobility
- Arterial Incident Management
- Freeway Mobility
- Freeway Incident Management



- Operations at the Freeway-Arterial Interface
- Transit Mobility
- Maintenance and Reliability
- Multi-Agency Coordination
- Travel Information
- Performance Measurement

The undersigned commit, based on available resources, to implement the Regional Concept of Transportation Operations as outlined in the Final Report. Resources required include both personnel and funding for planning, implementation, operations, and maintenance of local and regional transportation systems.

The undersigned will continue to cooperate in the development and implementation of policies and practices to facilitate the above named roles, responsibilities, and functions by participating in oversight and scoping that includes, but is not limited to, the following:

- Regional Transportation Engineering Collaboration
- EMS/Public Safety/Transportation Incident Management
- Freeway-Arterial Coordination
- Transit Signal Priority
- Shared Maintenance Resources
- Center-to-Center Communications
- Archived Data
- Local Traffic Management Centers/ADOT Traffic Operations Center Operators Coordination
- Travel Information Collection and Dissemination
- Emergency Vehicle Signal Preemption Standards
- Education and Outreach
- Performance Measurement

The undersigned will disseminate the information in this MOU and notify all affected employees of the agency's participation in the Regional Concept of Transportation Operations.



4. Conclusion

The undersigned agency hereby supports the Regional Concept of Transportation Operations Final Report, dated 2003, and pledges to coordinate and cooperate with the other MAG member agencies that are signatories to this MOU in surface transportation systems operations in the MAG Region to make the elements of the surface transportation system work better and together.

The MOU was approved by the MAG Regional Council on October 22, 2003. The MOU has subsequently been signed by several agencies within the MAG Region.

